

# **Covid-19's Impact on Travel and System Performance**

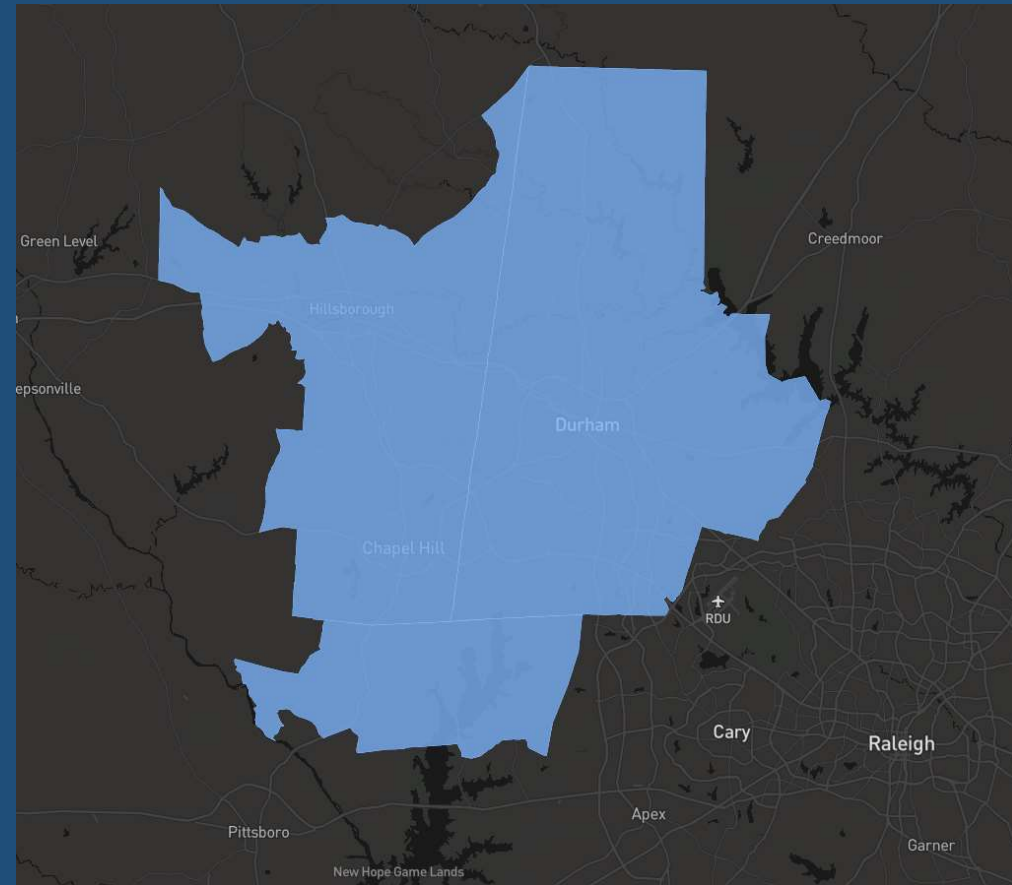
**Jaehoon Kim, Jacob Ford  
Yanping Zhang**

**Durham-Chapel Hill-Carrboro MPO**

**December 2<sup>nd</sup>, 2020**

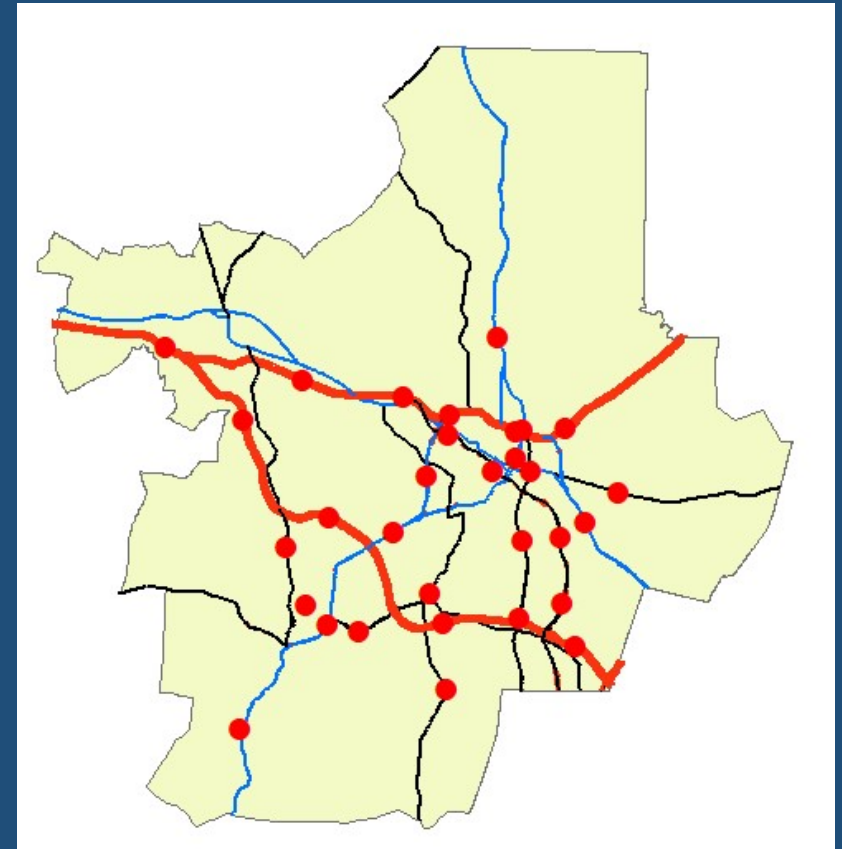
# Overview

- **Study Area – DCHC MPO (Durham, Orange, and norther Chatham counties)**
- **Data Sources: StreetLight Data, HERE Data, NPMRDS Data (RITIS), National Transit Database (NTD)**
- **Traffic Volume and VMT Changes**
- **Congestion Changes**
- **Trip by Purpose and Mode**
- **Trip Length Frequency**



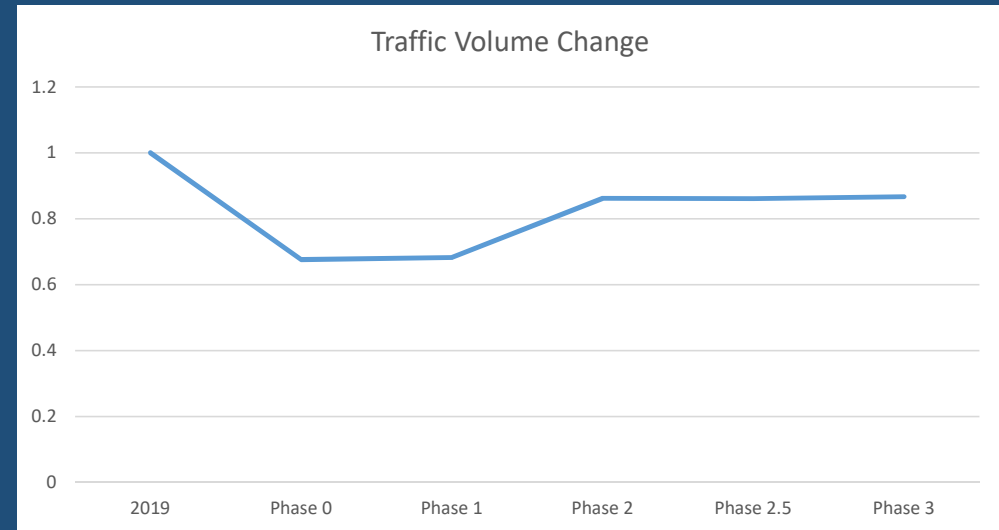
# Traffic Volume Changes

- **Locations**
  - 10 Locations on Interstate
  - 21 Locations on US and NC Highways
- **Periods**
  - 2019 AWDT (Normal Condition)
  - Phase 0 – Mar. 1 to May 7, 2020 (Early Stage)
  - Phase 1 – May 8 to May 21, 2020
  - Phase 2 – May 22 to Sep. 3, 2020
  - Phase 2.5 – Sep. 4 to Oct. 1, 2020
  - Phase 3 – Oct. 2 to Oct 23, 2020
- **Data Source**
  - StreetLight Data

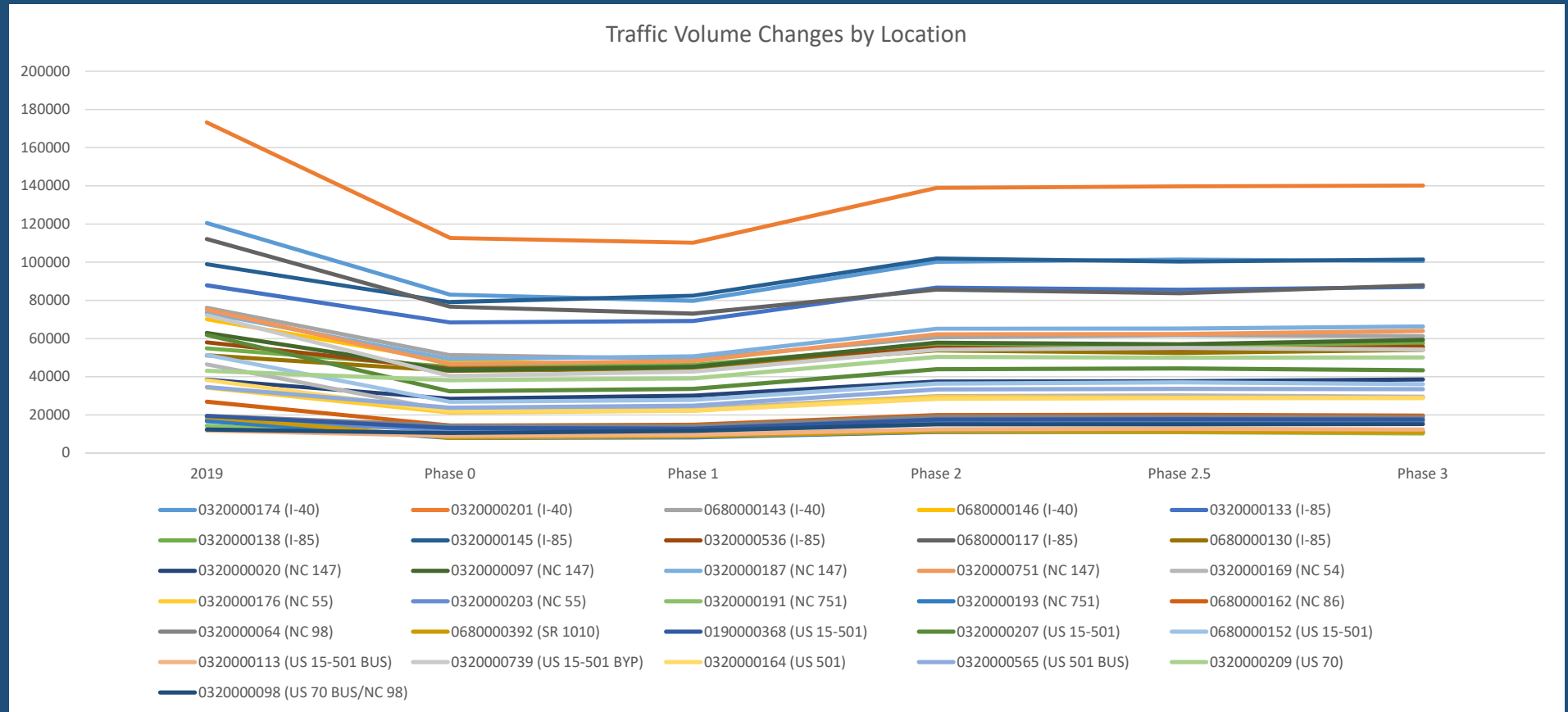


# Traffic Volume Changes

- Overall
  - 33% of traffic volume decreased in the Phase 0
  - Slightly increased in Phase 1
  - Roughly 86% of traffic volume on the network from the Phase 2 to current



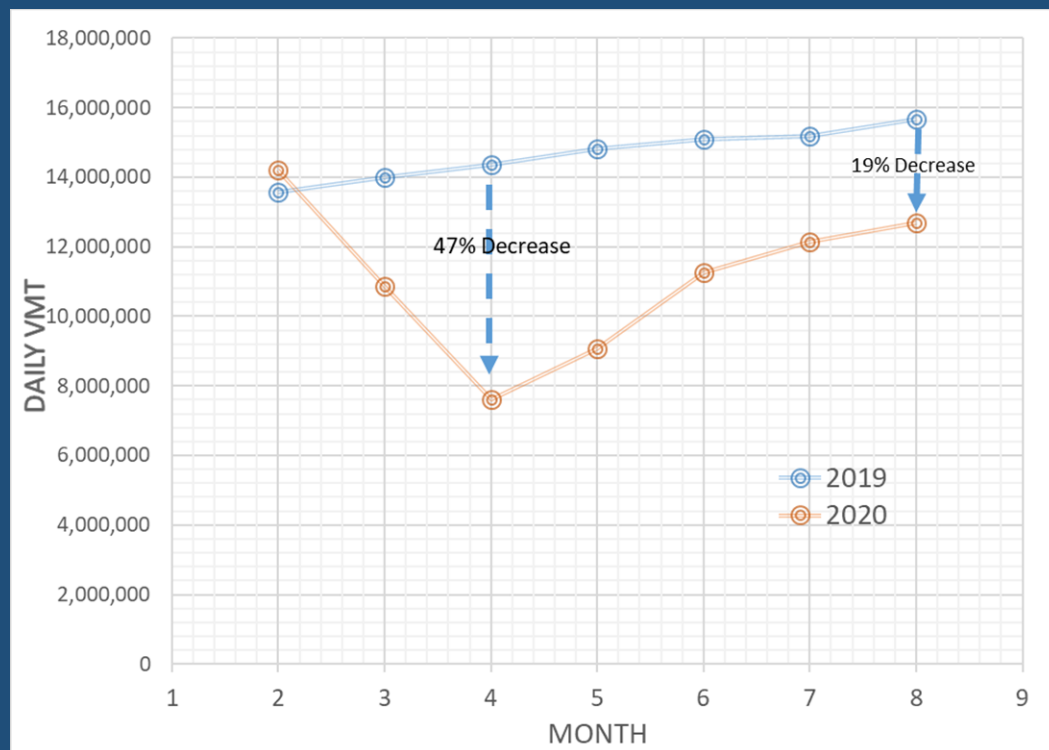
# Traffic Volume Changes



## Daily VMT Change in DCHC Area

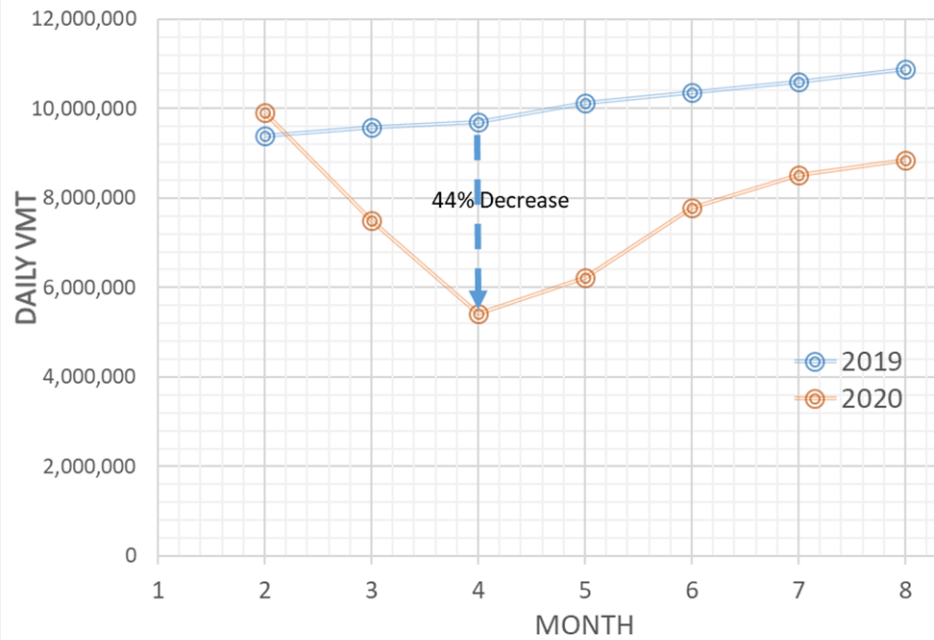
### Average Daily VMT

- **Source: Streetlight Data**
- **Calibration: Single factor OD approach**
- **47% Decrease in April 2020**
- **19% Decrease in August 2020**

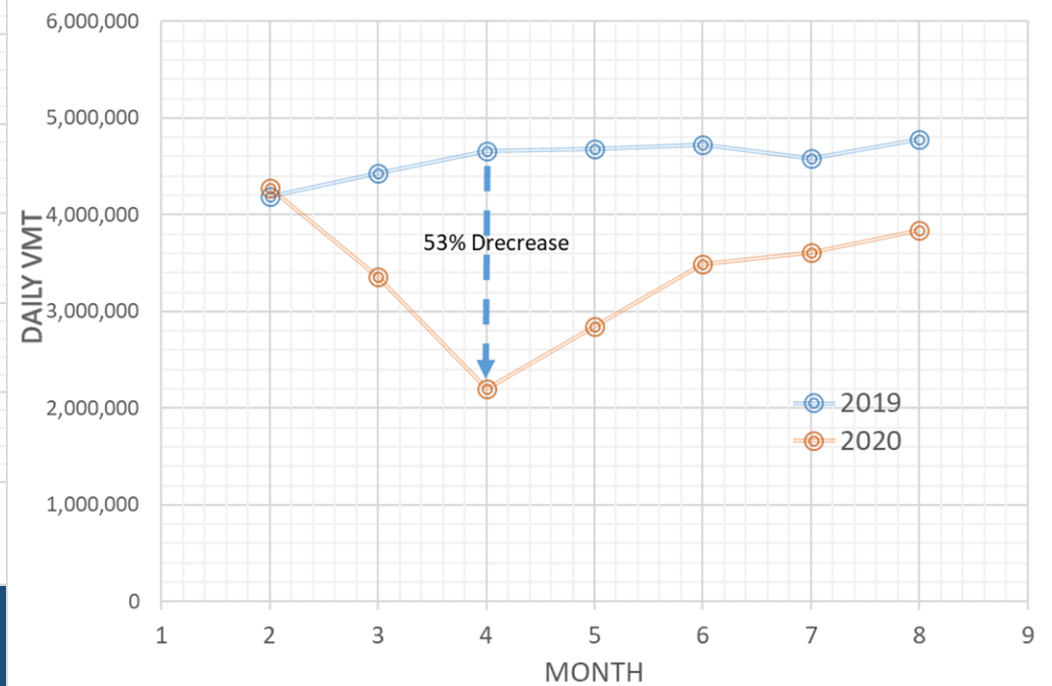


## Daily VMT Changes – Durham and Orange & Chatham

Durham County



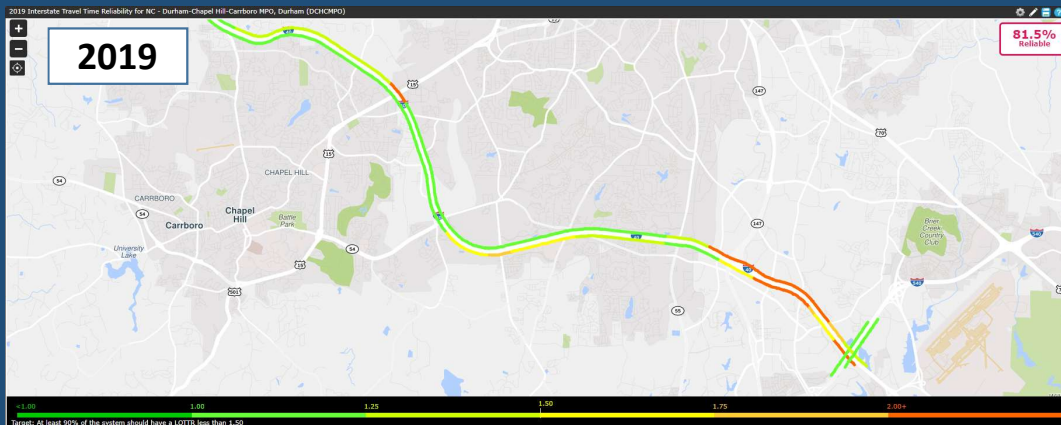
Orange & Chatham in DCHC



# Congestion Changes

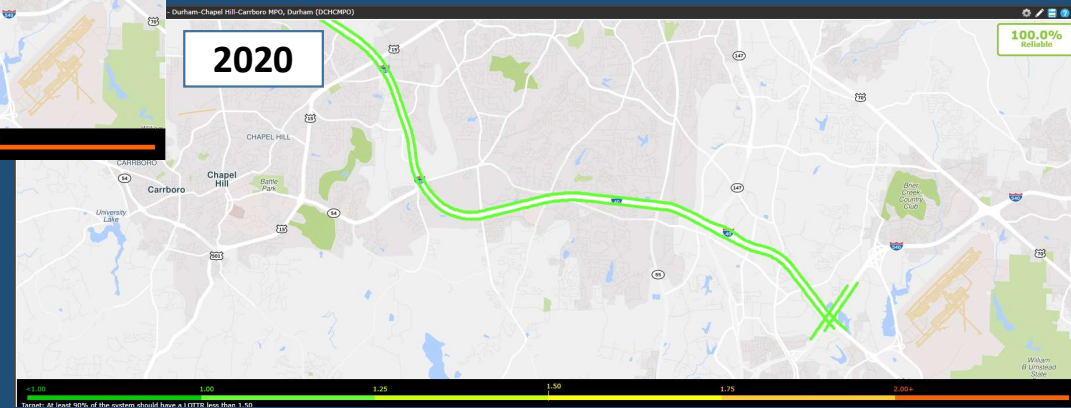
- Interstate Level of Travel Time Reliability – Annual Changes

- 81.5 -> 100.0%



\* Total 9 months (Jan.-Sep) data were available for 2020 LOTTR estimation.

\*\* Data Source: NPMRDS through RITIS

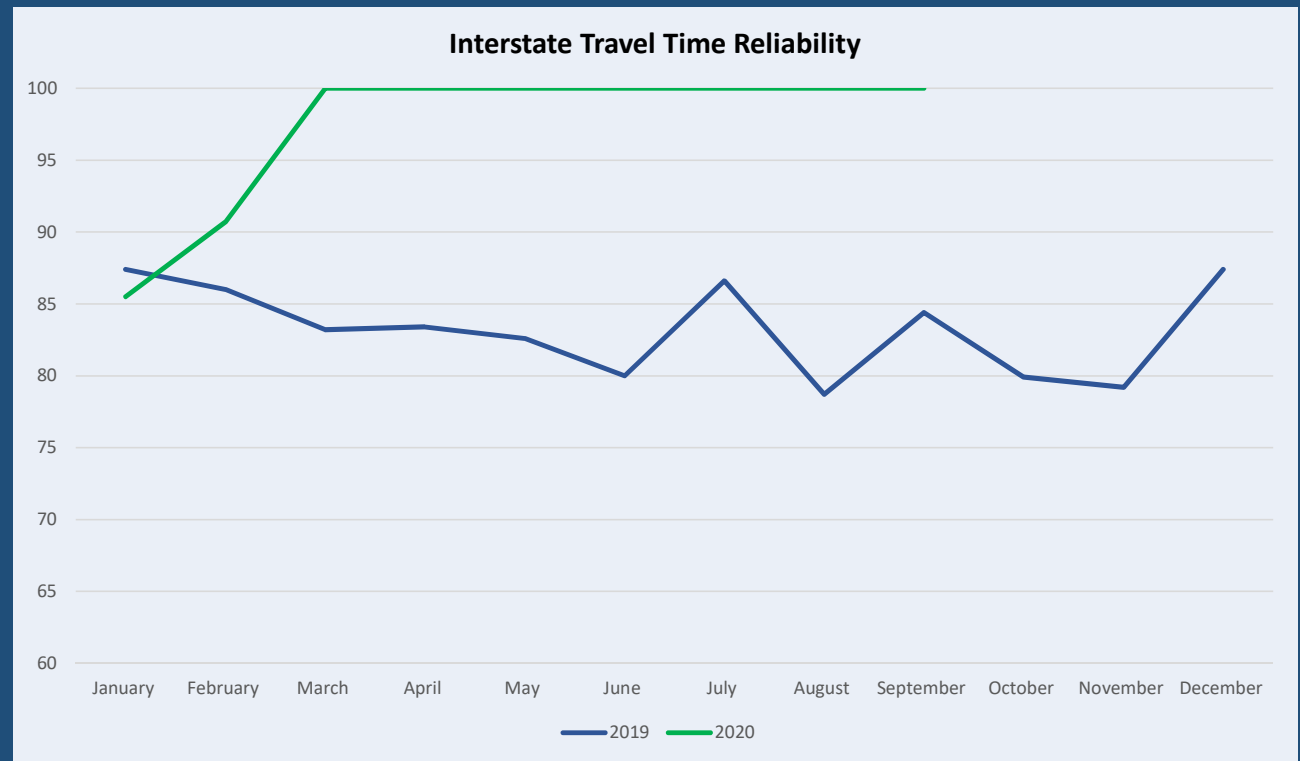




# Congestion Changes

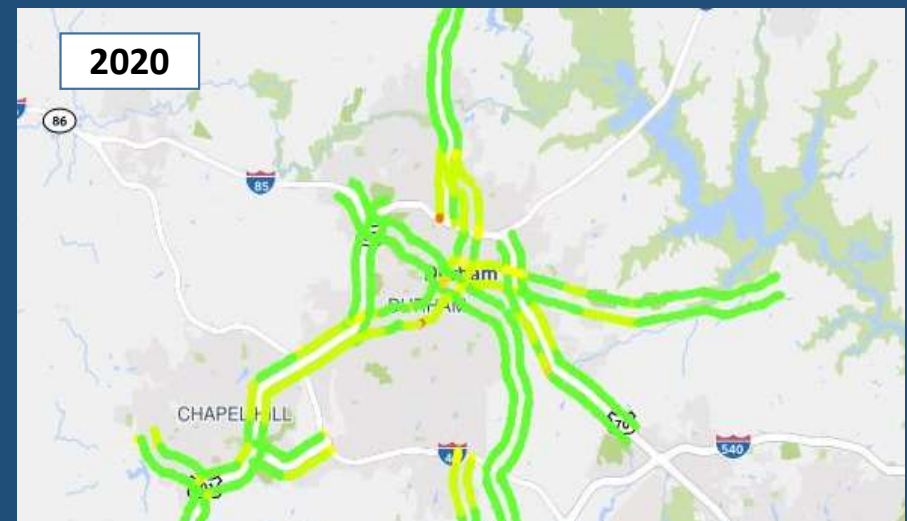
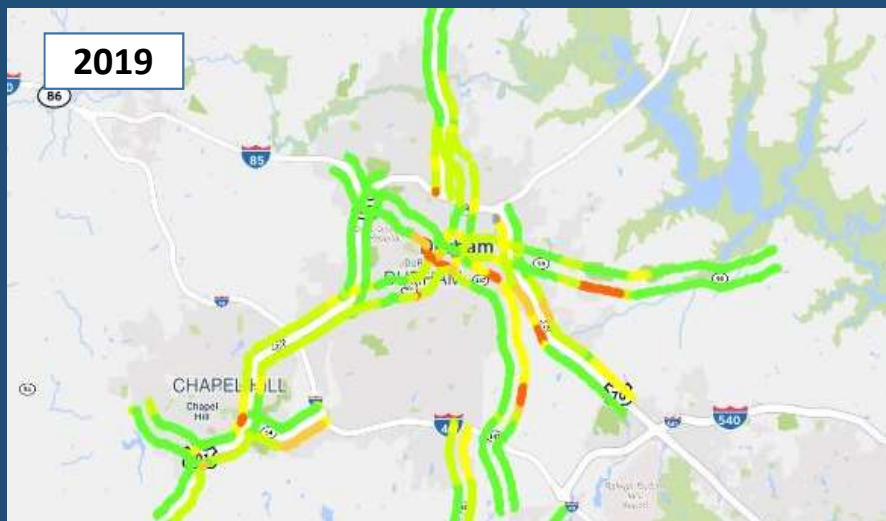
- Interstate Level of Travel Time Reliability – Monthly Changes

Month	2019 LOTTR (%)	2020 LOTTR (%)
January	87.4	85.5
February	86.0	90.7
March	83.2	100.0
April	83.4	100.0
May	82.6	100.0
June	80.0	100.0
July	86.6	100.0
August	78.7	100.0
September	84.4	100.0
October	79.9	
November	79.2	
December	87.4	



# Congestion Changes

- Non-Interstate NHS Level of Travel Time Reliability – Annual Changes
  - 81.3% (2019) -> 95.6% (2020)



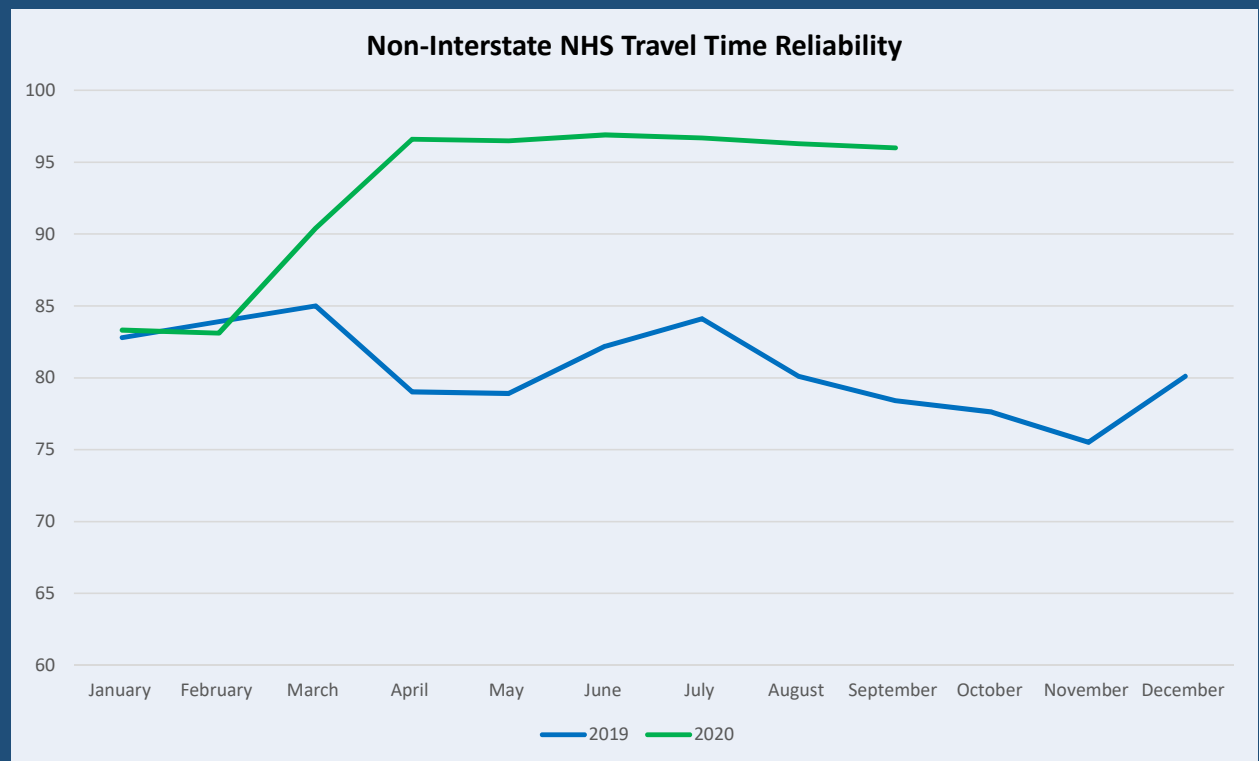
\* Total 9 months (Jan.-Sep) data were available for 2020 LOTTR estimation.

\*\* Data Source: NPMRDS through RITIS.

# Congestion Changes

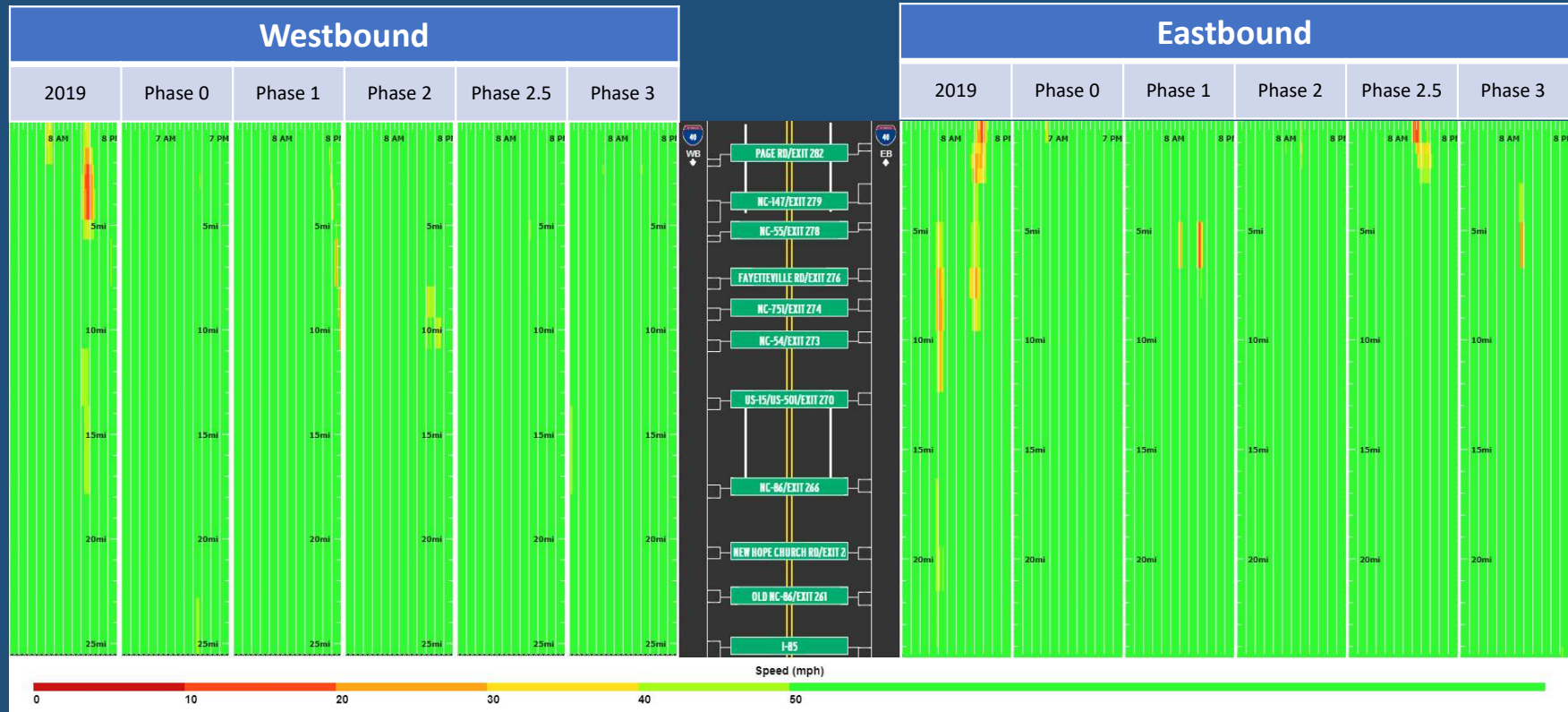
- Non-Interstate NHS Level of Travel Time Reliability – Monthly Changes

Month	2019 LOTTR (%)	2020 LOTTR (%)
January	82.8	83.3
February	83.9	83.1
March	85.0	90.4
April	79.0	96.6
May	78.9	96.5
June	82.2	96.9
July	84.1	96.7
August	80.1	96.3
September	78.4	96.0
October	77.6	
November	75.5	
December	80.1	



# Congestion Changes

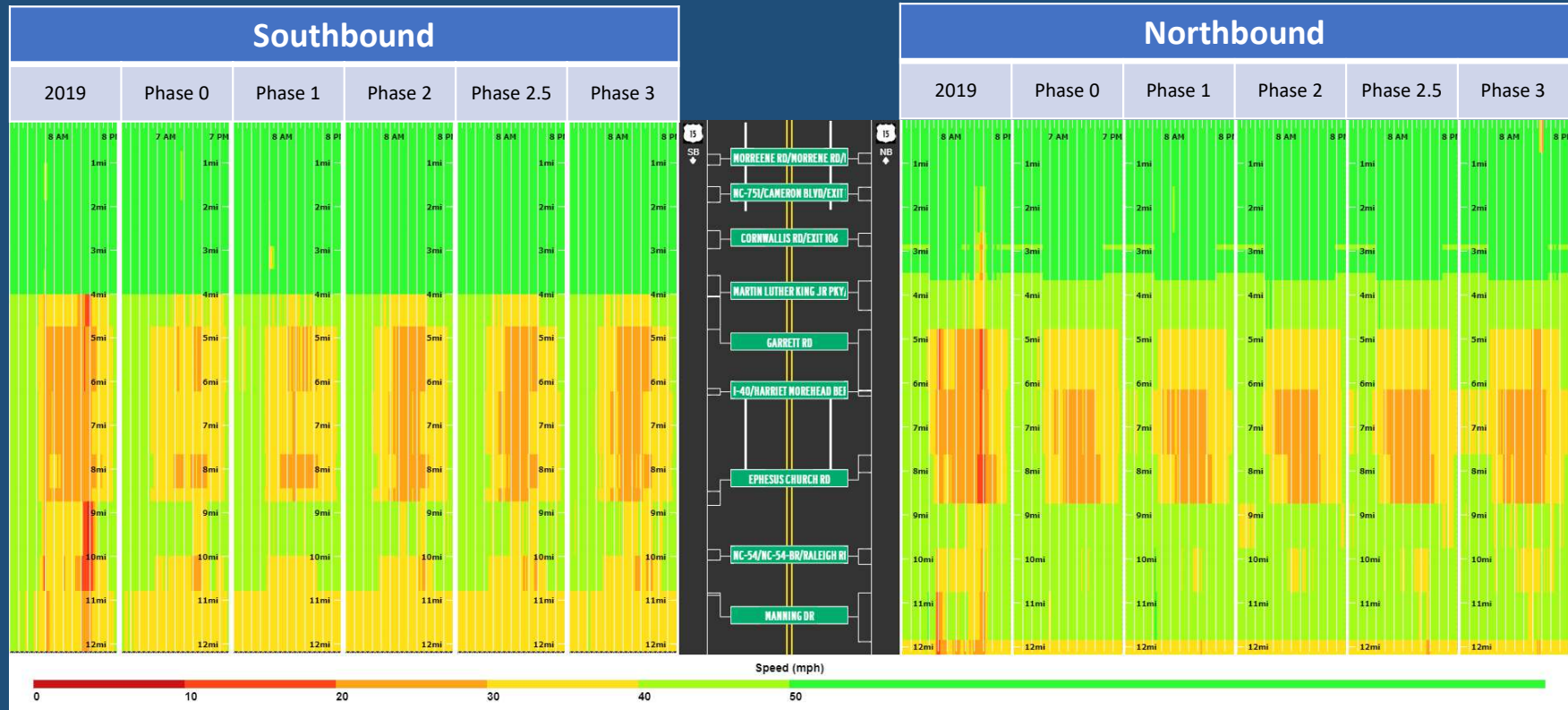
- Travel Speed Changes by Facility (I-40)



\* Data Source: HERE data through RITIS

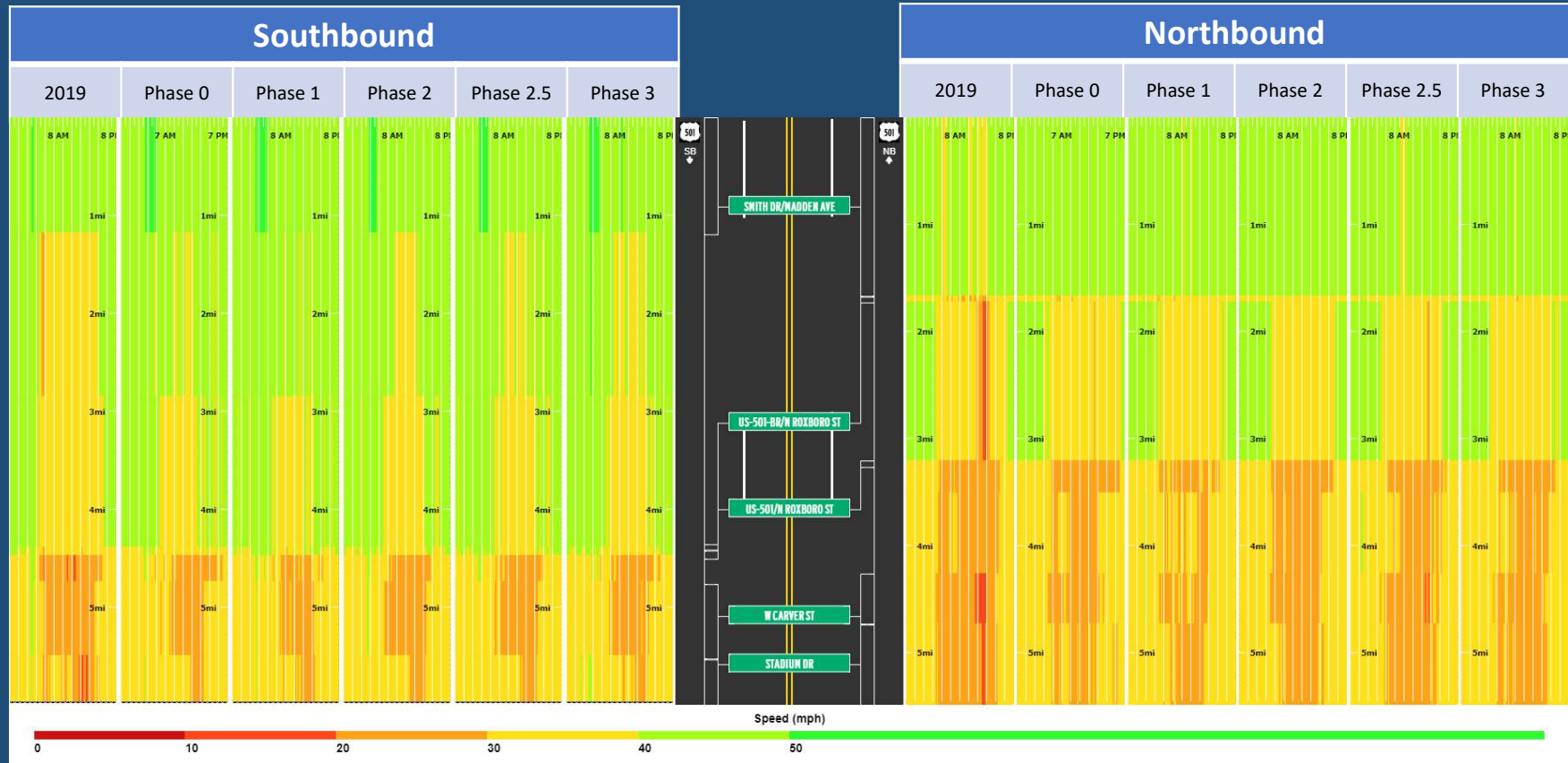
# Congestion Changes

- Travel Speed Changes by Facility (US 15-501)



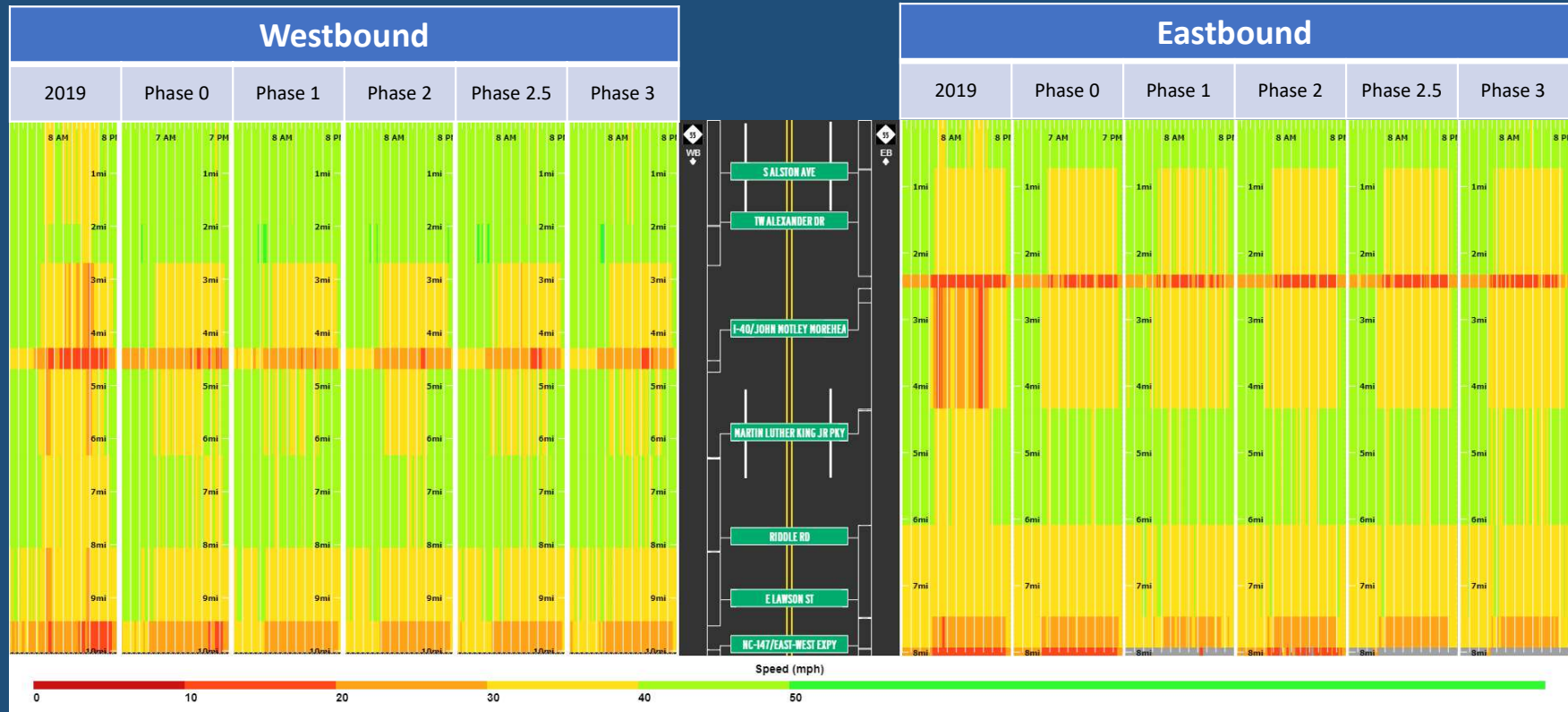
# Congestion Changes

- Travel Speed Changes by Facility (US-501)



# Congestion Changes

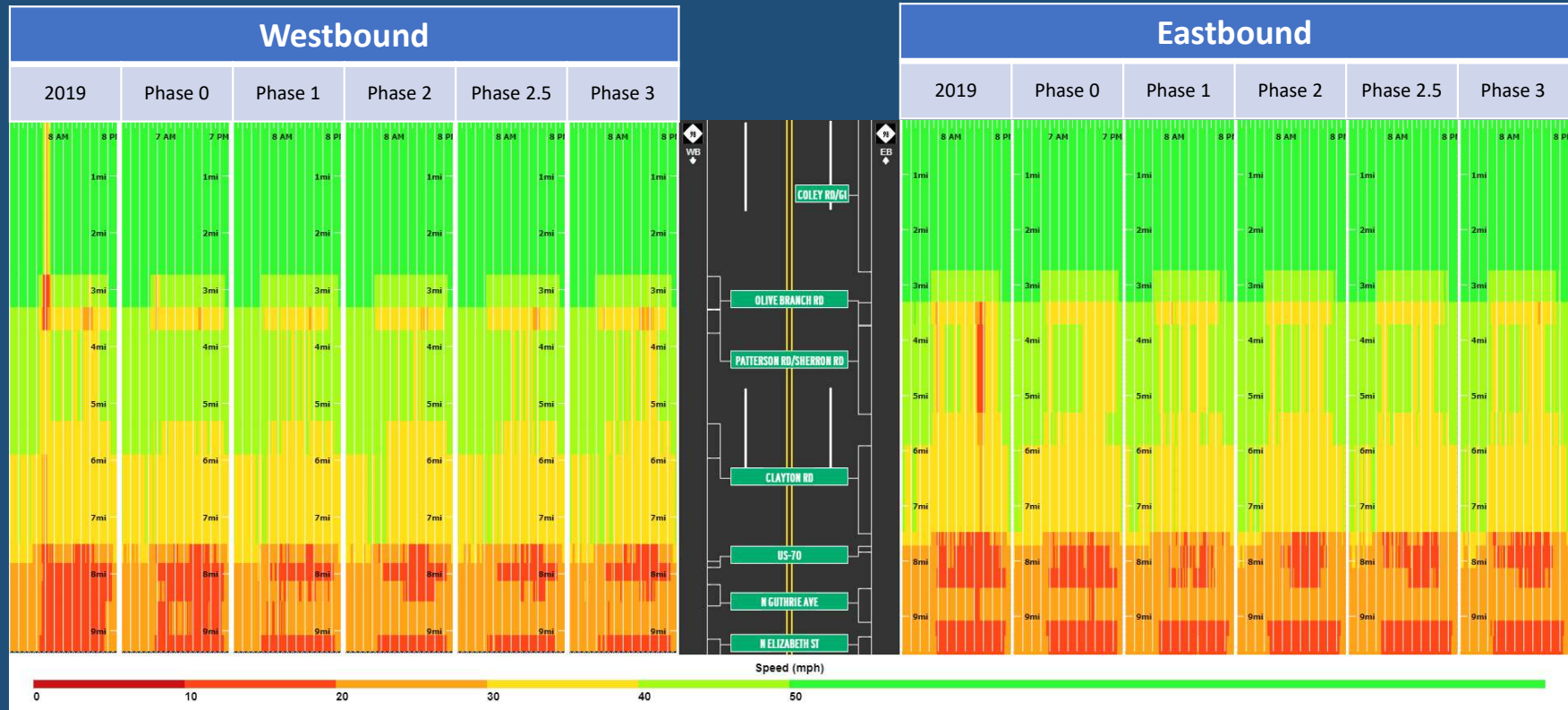
- Travel Speed Changes by Facility (NC-55)





# Congestion Changes

- Travel Speed Changes by Facility (NC-98)





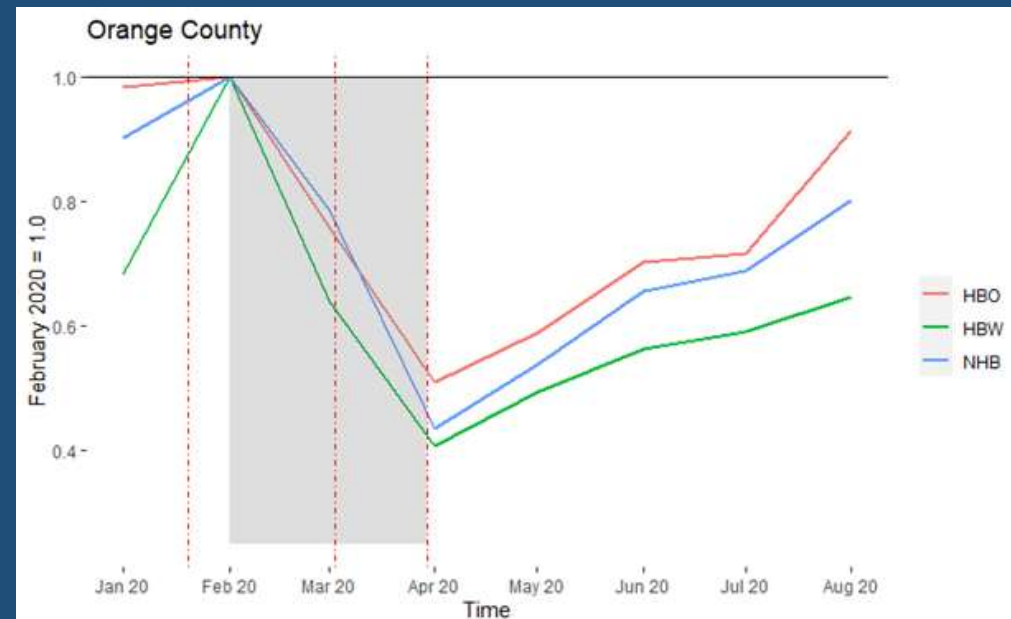
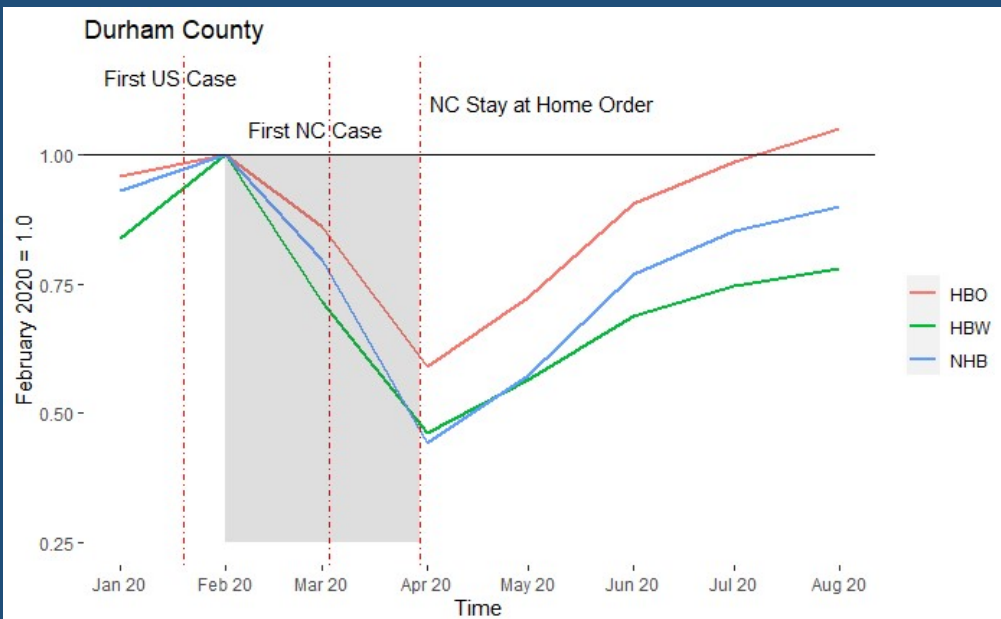
# Congestion Changes

- Travel Speed Changes by Facility (NC-147)



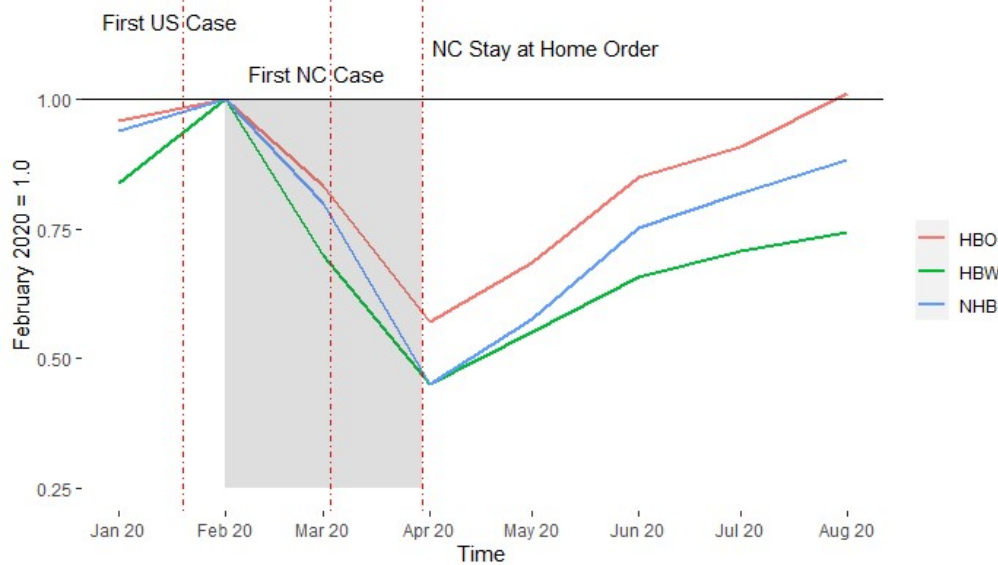
## Trip Index by Trip Purpose, 2020

- **Key Dates:**
  - First US Case: January 20<sup>th</sup>
  - First North Carolina Case: March 3<sup>rd</sup>
  - NC Stay-at-Home order enacted March 30<sup>th</sup>
- Individuals altered behaviors before government mandates
- Durham's 2020 Trip Rate relative to 2019:
  - February: -7.3%
  - March 1<sup>st</sup> – March 15<sup>th</sup>: -10.2%
  - March 16<sup>th</sup> – March 31<sup>st</sup>: -49.9%

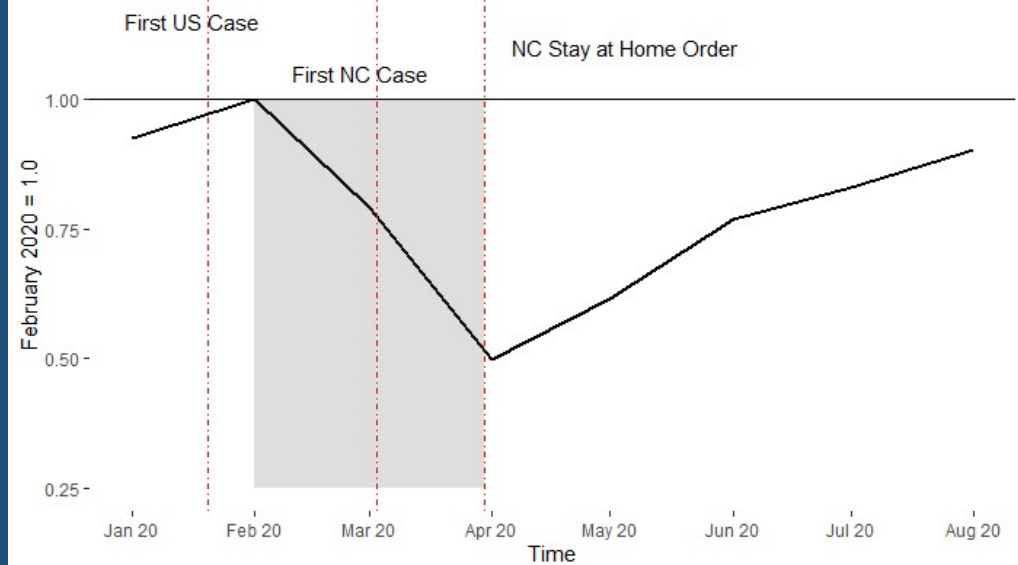


# Trip Index by Trip Purpose DCHC Region

Total Trip Index DCHC

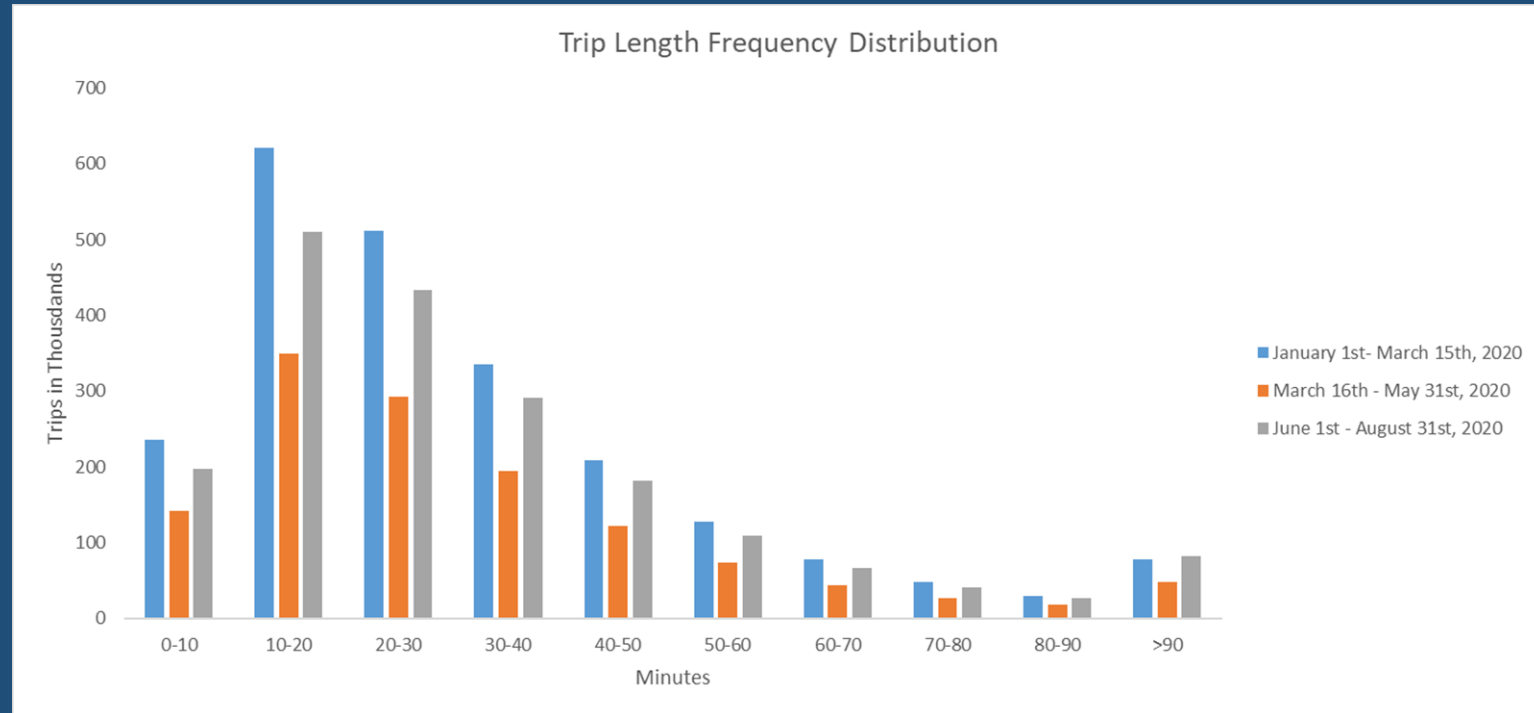


Total Trip Index DCHC



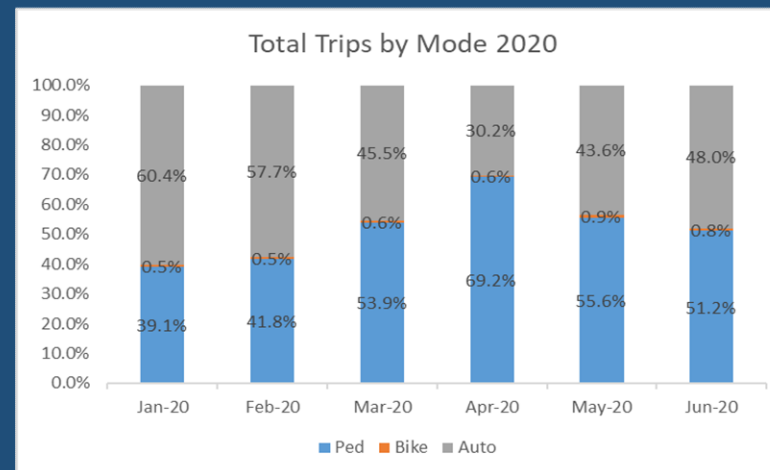
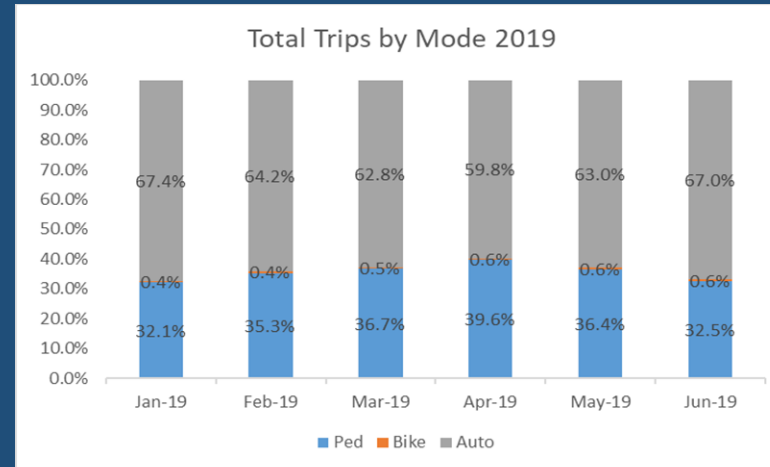
# Trip Length Frequency

- Decline across all length categories from first to second quarter. Gradual increase seen in third quarter
- Trips lasting 10-20 and 20-30 minutes recovered slowest, as school shutdowns and lockdowns may have limited short-term trips
- Longer trips demonstrate 'stickiness' by end of third quarter



## Mode Choice: Motorized vs Non-Motorized Person Trips

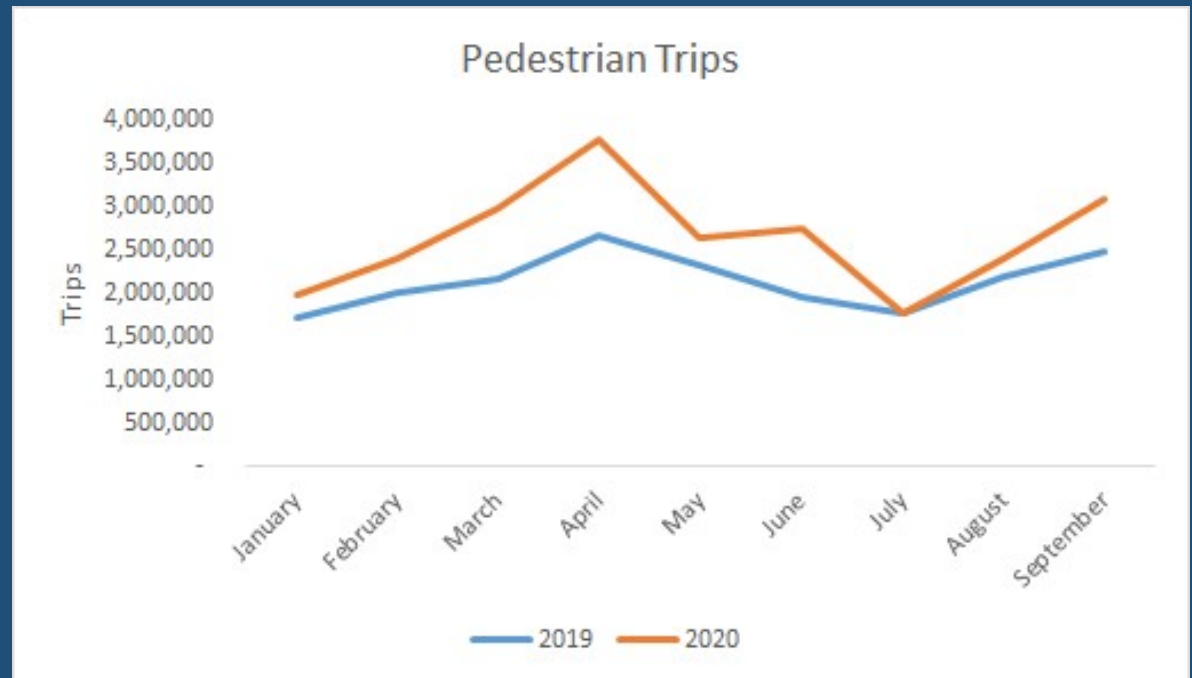
- Increase in total pedestrian trips compared to total automobile trips
- Spike in April 2020, 70% of total trips were non-motorized, compared to 40% in April 2019
- Increase in non-motorized trips attributed to pedestrian instead of bike trips



**\* Data represents unlinked trips**

# Mode Choice: Pedestrian Trips

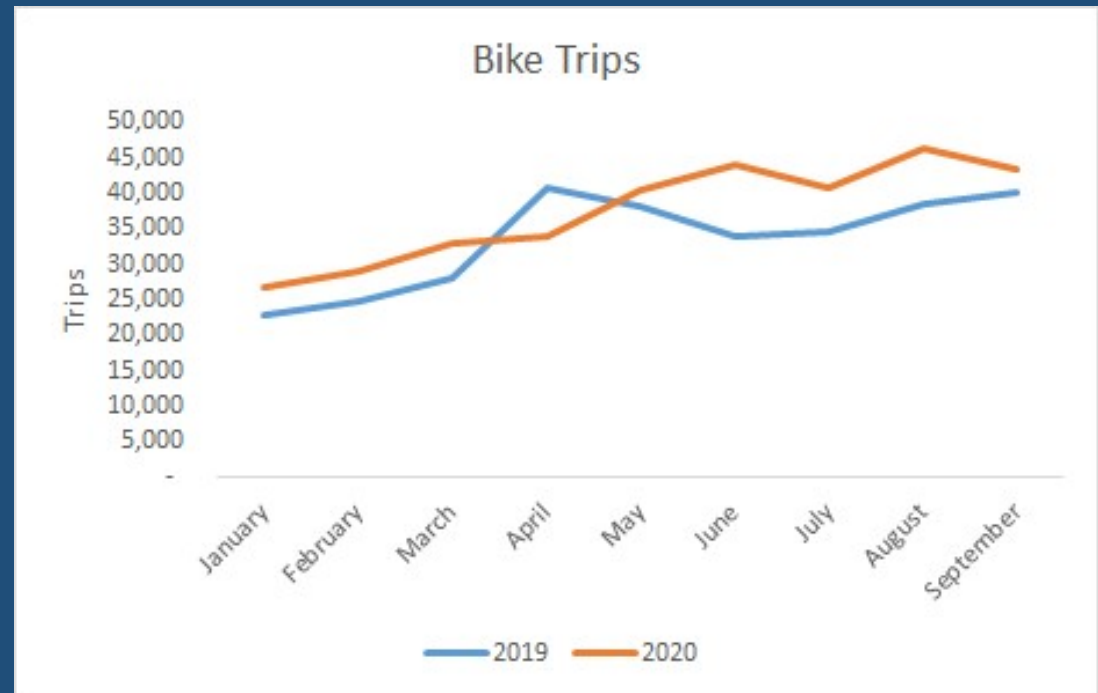
- Trips increased 24% relative to 2019
- April 41% higher in 2020 compared to April 2019
  - March to June: 33%



*\*Data represents unlinked trips*

## Mode Choice: Bike Trips

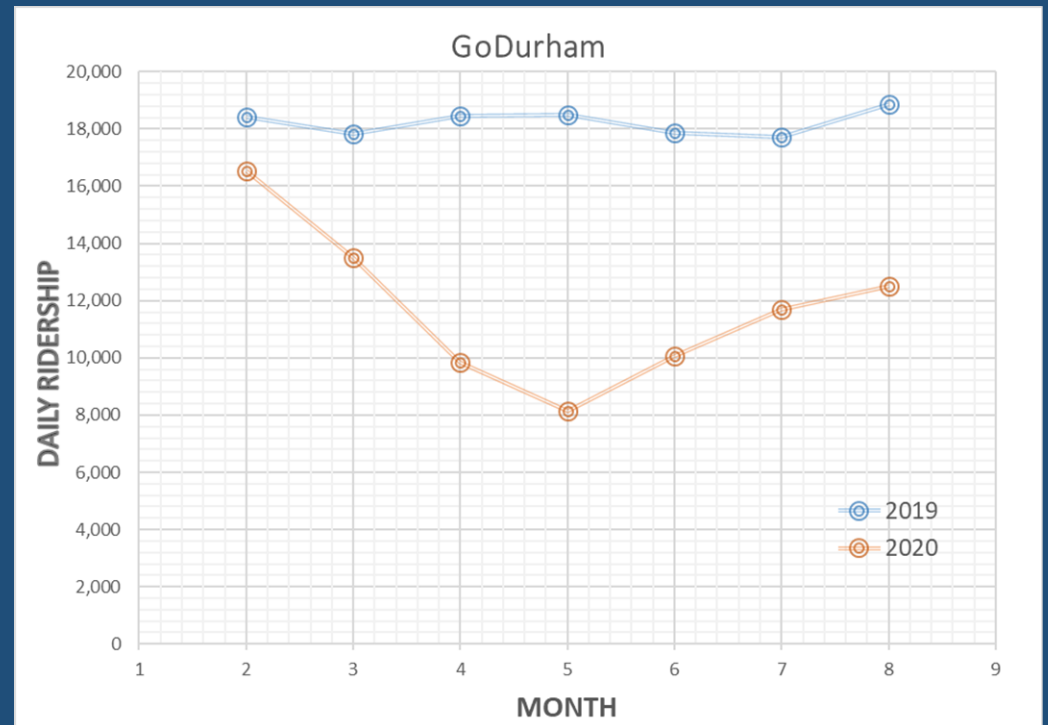
- Over nine month period, trips increased 12%
- Summer months, June to August, Bike trips increased 23% from 2019
- Supply struggled to meet surging demand



*\* Data represents unlinked trips*

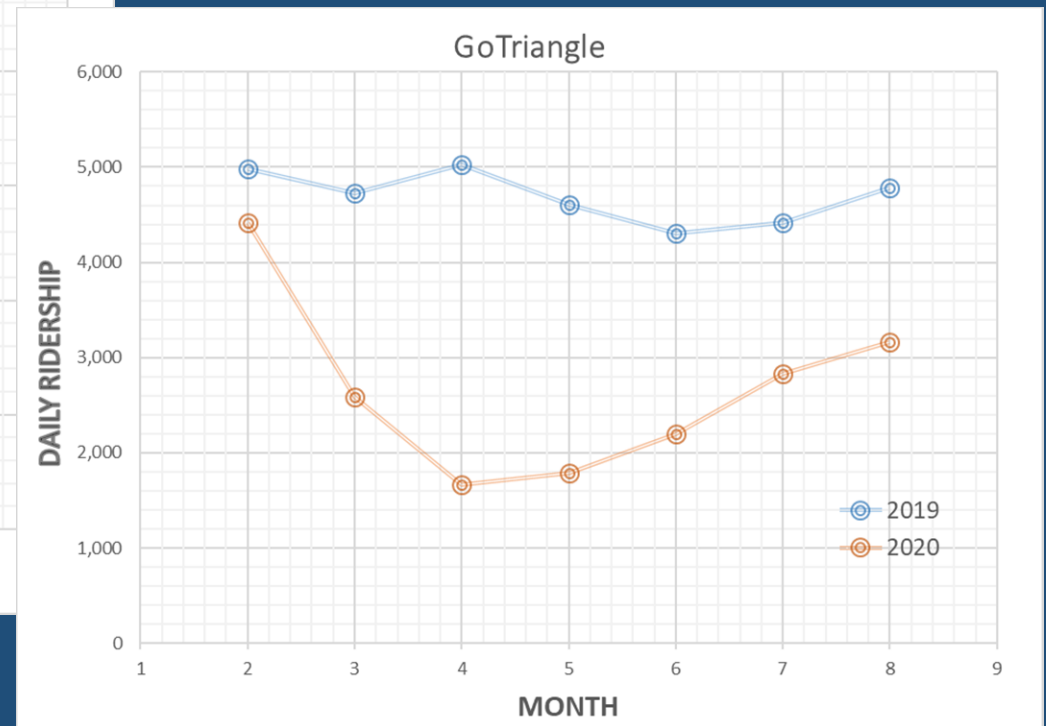
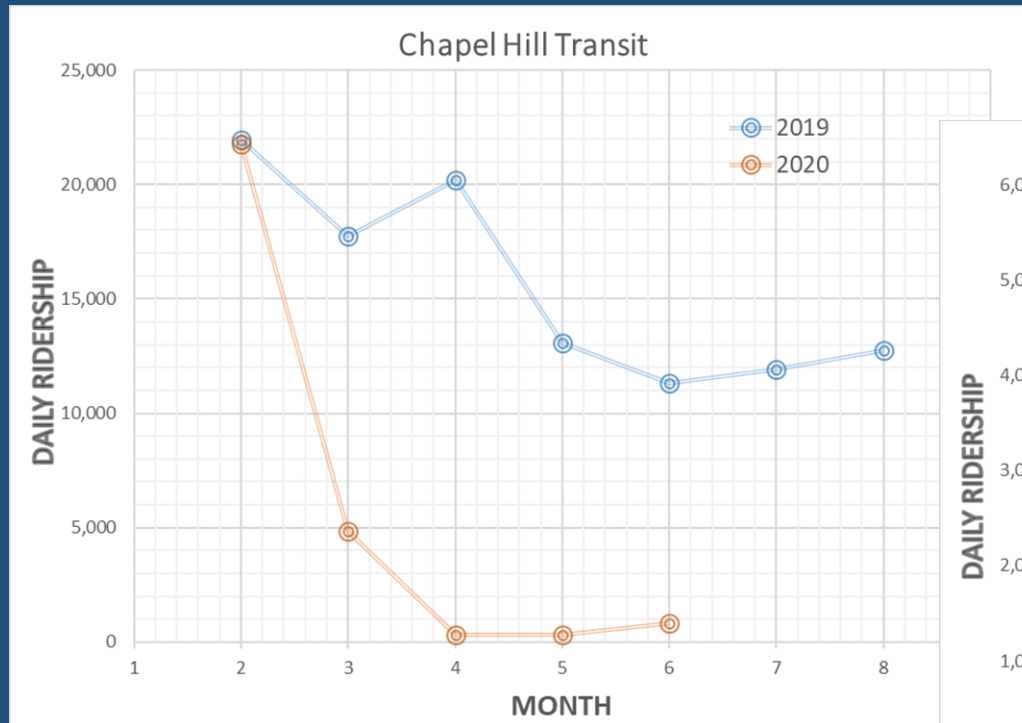
## Average Daily Bus Ridership

- **Data Source: National Transit Database (NTD)**
- **GoDurham has a 56% decrease in May**
- **Chapel Hill Transit has a 98% decrease in April while Gotriangle has a 47% decrease**





## Average Daily Bus Ridership - 2



## Summary

- **Average Travel Speed increased compared to 2019 while VMT decreased**
  - **Significant increase on the Interstates**
- **Lower class roadways show similar travel time/speed with 2019.**
  - **Interrupted Facility**
  - **Access Points**
- **Best congestion condition in Phase 0 and Phase 1; slightly congestion level increased from Phase 2**
- **Trip frequency reacted to COVID before government shutdowns in North Carolina**
- **HBW and NHB trips saw greatest decline and slowest recovery across the region**
- **Pedestrian trips increased significantly, with gains in Bike trips; meanwhile transit ridership fell across the region, notably in Chapel Hill**